

## Chapter 6 GD&S Performance Evaluation Criteria

### 6-1. Introduction

The objective of developing performance evaluation criteria is to establish a protocol for assessing the periodic status of progress toward the goals set in the Implementation Plan by the USACE Command. The key aspect in evaluating the performance of a GD&S implementation is determining whether the system is satisfying user needs, both inside and outside USACE. Selden (1987) proposed a definition of GD&S success which provides an overall framework to construct specific performance evaluation criteria. This definition is as follows:

*[GD&S] success is defined as the meeting of organizational requirements for the collection, management, analysis, display, and distribution of geographic/geographically-defined information commensurate with the level of investment over time. Furthermore, [GD&S] success is measured by the degree to which it becomes integrated into, and a part of, an organization's overall information resources infrastructure over the long term.*

### 6-2. Benefits of GD&S

The documented results of a GD&S implementation performance evaluation can have a beneficial impact in several critical areas including: the preparation of budget requests, the creation of information management plans and assisting Headquarters in responding to a variety of data requests.

### 6-3. Schedule of Evaluation

The evaluation must initially be performed one year after the approval of the Implementation Plan. This will provide a first impression of how the plan is being carried out. After this initial evaluation, re-evaluations of progress must be made on an annual basis. An information copy of evaluations is to be sent to HQUSACE (CECW-EP-S).

### 6-4. Issues Associated with the Development of Evaluation Criteria

The evaluation criteria listed in this section cover four major areas: technical, financial, organizational, and personnel. Technical evaluation criteria include software, hardware, data, interfaces, and standards. A good starting point in the development of criteria are the five basic objectives, outlined by the General Accounting Office (GAO, Evaluating the Acquisition and Operation of Information Systems, 1986) for the acquisition and operation of information systems:

*a. Ensure system effectiveness.* As stated in the implementation plan and requirements analysis, system effectiveness is measured by determining whether the system performs the intended functions and whether users get the information they need, in the right form, in a timely fashion. The following basic questions should be answered and explained with examples:

- Did you accomplish the goals of using the GD&S that you stated in your implementation plan/requirements analysis?
- Does the GD&S implementation produce real products which meet operational needs?
- Does the GD&S implementation provide meaningful support to senior decision-makers?
- Does the use of GD&S implementation promote inter-disciplinary, inter-departmental, intra-organizational, and inter-organizational coordination and cooperation?

To answer these questions, analysts should develop a table which lists the goals and requirements from the Implementation Plan in one column and GD&S implementations in the other. An example is provided at Table 6-1.

**Table 6-1**  
**Example Goals/Implementations**

Goals/Requirements	GD&S Implementation
Develop a comprehensive inventory and tracking system for all spatial data holdings.	Using GD&S to convert all spatial data into a common format or projection and developing on-line system to display current data holdings.
Educate staff in the operation of an GD&S.	Setting up and conducting a GD&S training course; developed an GD&S; in-house GD&S training manual.

*b. Promote system economy and efficiency.* An economical and efficient GD&S implementation uses the minimum number of information resources to achieve the output level the system's users require. Under this category, a measure of GD&S implementation success would be the answers to the following questions:

- Can you describe instances where you saved time or money by using a GD&S, had fewer errors in products, were able to locate data to share?

- Are you a successful participant in the Clearinghouse for provision of data? Do you provide metadata to the Clearinghouse? Have you received data through the Clearinghouse?

To quantify the answer to these questions, a comparison could be made of the cost (money and time) of doing business before and after the implementation of GD&S. For example, another table could be developed which lists applications/projects and resources (time, money, labor) to complete. This assumes that adequate data exists on the costs associated with projects before GD&S was implemented, a form of information that should be gathered with the requirements analysis. An example of such a table is shown at Table 6-2.

*c. Protect data integrity.* Data integrity requires that systems have adequate controls over how data are entered, communicated, processed, stored and reported. Under this category, consider how the GD&S implementation has affected the organization and management of your data. Consider such items as:

- Data redundancy -- Have multiple copies of the same data set been eliminated?
- Clarity of presentation -- Is the data being presented in a more meaningful way?
- Time and costs associated with data entry -- Is data converted and stored in a common GD&S format?
- Data stewardship -- Has responsibility for maintenance of data and preparation of metadata been established?
- Data exchange formats -- Can data be easily transferred into and out of the system?

*d. Safeguard information resources.* Information resources, which include hardware, software, data, and people, need to be protected against waste, loss, unauthorized use and/or fraud. This category basically deals with data security and system access. Some of the implementation evaluation criteria in this section include:

- Are there standard practices and procedures in place to process sensitive or classified data within the GD&S?
- Is there a system configuration plan in place?
- Are proper file access privileges in place to control unauthorized access to system files, the operating

system, common data directories, and user directories?

*e. Comply with laws and regulations.* Compliance with laws, regulations, policies, and procedures that govern the acquisition, development, operation, and maintenance of information systems must be ensured. A question like the following evaluates this:

- Has the implementation of a GD&S put your organization in a better position to comply with government regulations and reporting requirements not only with system operation and maintenance issues but also with respect to projects associated with litigation support which are related to government regulations?

*f. Additional evaluation criteria.* Other questions to consider in the implementation evaluation are:

- Are you growing in your use of GD&S technology, i.e., are you using it in new ways?
- Is the GD&S allowing you to do more work, new work, and has it increased your customer base?
- Are more people interested in the GD&S? Is your success attracting new customers?

**Table 6-2**  
**GD&S Effectiveness Evaluation**

Application/Project Name: \_\_\_\_\_

Project statistics	Before GD&S	After GD&S
Dollar cost		
Labor hours		
Time to complete		

Additional project statistics could be developed as necessary. To fill in the project statistics, break down the project into tasks and determine the time and cost associated with each task. For example, consider a project which requires the determination of chemical plume spreading in groundwater. A detailed table listing tasks and costs could be developed as follows:

Labor requirements with and without GD&S

Task/Product (Hours)	Technician Labor (Hours)	Engineer/Scientist (\$)	Cost
	Before/After	Before/After	Before/After
Data Entry			
Well Logs			
Contour Maps			
Cross Sections			
Time-Series Plots			